

## CLAIMS

- 1     1. An apparatus for use at railroad crossings comprising:  
2             a control receiver for detecting activation and completion signals from a control  
3 transmitter;  
4             a multi-signal generator for simultaneously providing a plurality of signals within  
5 a portion of a selected frequency band and having a center frequency and relative fre-  
6 quency spacing of said simultaneous plurality of signals, wherein said multi-signal gen-  
7 erator is a variable multi-signal generator for selectively adjusting said center frequency  
8 to cause said plurality of signals to cover a differing of the selected frequency band;  
9             a modulator connected to said multi-signal generator for selectively and simulta-  
10 neously modulating said plurality of signals;  
11             a control unit for selectively controlling said multi-signal generator center fre-  
12 quency; and  
13             wherein the transmitter begins transmission upon receipt of the activation signal  
14 and ceases transmission upon receipt of the completion signal.
- 1     2. The apparatus of claim 1, wherein said multi-signal generator further includes a wave  
2 memory for reproducing a selected waveform output signal providing said plurality of  
3 signals.
- 1     3. The apparatus of claim 2, wherein said wave memory output signal comprises a plu-  
2 rality of signals corresponding to a different portion of said selected band.
- 1     4. The apparatus of claim 3, wherein said control unit provides prestored waveforms  
2 selectively transferred to said wave memory to provide said plurality of signals on a cor-  
3 responding portion of said selected band.
- 1     5. The apparatus of claim 2, further including a waveform converter connected to re-  
2 ceive said reproduced selected waveform output signal and provide a converted output  
3 signal.

1 6. The apparatus of claim 1 wherein the activation and completion signals originate from  
2 a control transmitter located onboard a locomotive.

1 7. The apparatus of claim 1 wherein said plurality of signals comprises an audio message  
2 warning of an approaching locomotive.

1 8. The apparatus of claim 2, further including a programmable signal generator provid-  
2 ing a programmable output signal and a mixer receiving said programmable output signal  
3 and said converted output signal and providing a mixer output therefrom, wherein said  
4 programmable output signal is selectively varied to provide a plurality of signals at dif-  
5 ferent portions of a selected band.

1 9. The apparatus of claim 8, wherein said programmable signal generator is controlled by  
2 said control unit to selectively provide different output signals, which when received  
3 by said mixer, provides said plurality of signals corresponding to substantially all of said  
4 selected frequency band.

1 10. The apparatus of claim 9 further including a frequency modulator connected to said  
2 programmable signal generator for frequency modulating the output signal thereof ac-  
3 cording to an audio signal.

1 11. The apparatus of claim 8, further including a power amplifier selectively receiving  
2 from one of said mixer output signal and said converted signal, and providing a trans-  
3 mitter output signal.

1 12. A dual-mode transmitter for use at railroad crossing, comprising:  
2 a first signal generator for simultaneously providing a plurality of carrier signals  
3 within a frequency band and having a relative frequency spacing, and including an am-  
4 plitude modulator of said plurality of said plurality of signals according to a  
5 modulation signal;

6 a second signal generator for selectively providing a selectable frequency signal,  
7 and including a frequency modulator of said selectable frequency according to a modulation signal;  
8

9 a mixer receiving the output signals of said first and second signal generators,  
10 and providing an output signal;

11 a power amplifier for selectively receiving said signals corresponding to said  
12 plurality of signals from said first signal generator and said mixer output signal, providing a signal to an antenna according to said selectively received signal;  
13

14 a control means for selectably enabling said first signal amplitude modulator in a  
15 first mode, and said second signal generator frequency modulator in a second mode; and

16 means for detecting an activation signal and a completion signal; and

17 means for activating the dual-mode transmitter in response to receipt of the activation signal and for deactivating the dual-mode transmitter in response to receipt of the completion signal..  
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1 13. The transmitter of claim 12 further comprising an audio source comprising one of an  
2 audio memory for providing a prestored audio signal selected by said control unit, and a  
3 microphone, said audio source being selectively connected to said amplitude modulator  
4 and said frequency modulator.

1 14. The transmitter of claim 12, wherein said first signal generator comprises means for  
2 providing a plurality of signals in selected portions of said frequency band according to  
3 said control unit wherein said selected portions substantially comprise said frequency  
4 band.

1 15. The transmitter of claim 12, wherein said first signal generator comprises means for  
2 providing a plurality of signals in at least one selected portion of said frequency band  
3 according to said control unit, and said second signal generator provides said selectable  
4 frequency signal according to said control unit, wherein said mixer output signals comprise selected portions which substantially comprise said frequency band.  
5

1 16. A method for transmitting an alert of an approaching locomotive, the method com-  
2 prising the steps of:  
3 sending, by a control transmitter located on the locomotive, an activation signal  
4 to a control receiver;  
5 activating, by a control module operatively interconnected with the control re-  
6 ceiver, a dual-mode transmitter adapted to transmit a warning message across one or  
7 more broadcast bands;  
8 deactivating, by the control module upon receipt of a completion signal from the  
9 control transmitter, the dual-mode transmitter

1 17. The method of claim 16 wherein the warning message is stored as a prestored wave-  
2 form in a wave memory in a wave memory of the dual-mode transmitter.

1 18. The method of claim 17 wherein the step of activating the dual-mode transmitter  
2 further comprises the steps of:  
3 (a) loading a predetermined waveform;  
4 (b) tuning a phase-locked loop frequency synthesizer to an appropriate frequency;  
5 (c) activating a power amplifier;  
6 (d) playing the warning message over a portion of the one or more broadcast bands;  
7 (e) selecting a next portion of the one or more broadcast bands; and  
8 (f) looping to step (a).

1 19. An apparatus for use at railroad crossings comprising:  
2 a control receiver;  
3 a multi-signal generator;  
4 a modulator connected to said multi-signal generator; for selectively and simulta-  
5 neously modulating said plurality of signals;  
6 a control unit; for selectively controlling said multi-signal generator center fre-  
7 quency; and  
8 wherein the multi-signal generator simultaneously provides a plurality of signals  
9 within a portion of a selected frequency band and having a center frequency and relative

10 frequency spacing of said simultaneous plurality of signals and wherein said multi-signal  
11 generator is a variable multi-signal generator for selectively adjusting said center fre-  
12 quency to cause said plurality of signals to cover a differing of the selected frequency  
13 band.

14 wherein the transmitter begins transmission upon receipt of the activation signal  
15 and ceases transmission upon receipt of the completion signal.

1 20. The apparatus of claim 19 wherein the control receiver is adapted to detect an ac-  
2 tivation signal and a completion signal from a control transmitter; and

3 wherein the apparatus begins transmission upon receipt of the activation signal  
4 and ceases transmission upon receipt of the completion signal.

1 21. The apparatus of claim 1, wherein said multi-signal generator further includes a  
2 wave memory for reproducing a selected waveform output signal providing said plurality  
3 of signals.

1 22. The apparatus of claim 21, wherein said wave memory output signal comprises a  
2 plurality of signals corresponding to a different portion of said selected band.

1 23. The apparatus of claim 22, wherein said control unit provides prestored waveforms  
2 selectively transferred to said wave memory to provide said plurality of signals on a cor-  
3 responding portion of said selected band.